3RD ANNUAL ENERGY STORAGE GRAND CHALLENGE SUMMIT

Energy Storage for Social Equity

ENERGY STORAGE GRAND CHALLENGE
U.S. DEPARTMENT OF ENERGY

KVH Energy Projects

Goldendale Energy Exchange for Rural Energy Solutions


Klickitat Valley
HEALTH


CONFEDERATED
TRIBES AND BANDS
YAKAMA NATION
TREATY OF
1855

From Denmark to Goldendale…

CSI
Center for Sustainable Infrastructure


Original Sound: On
Recording...
Logan Cullums (WSDOT)
Julie Fonseca de Borges (S...
D
Despina.Chymeftos
USDA Ambrea Cormier
MacBook Air

Pacific Northwest
NATIONAL LABORATORY

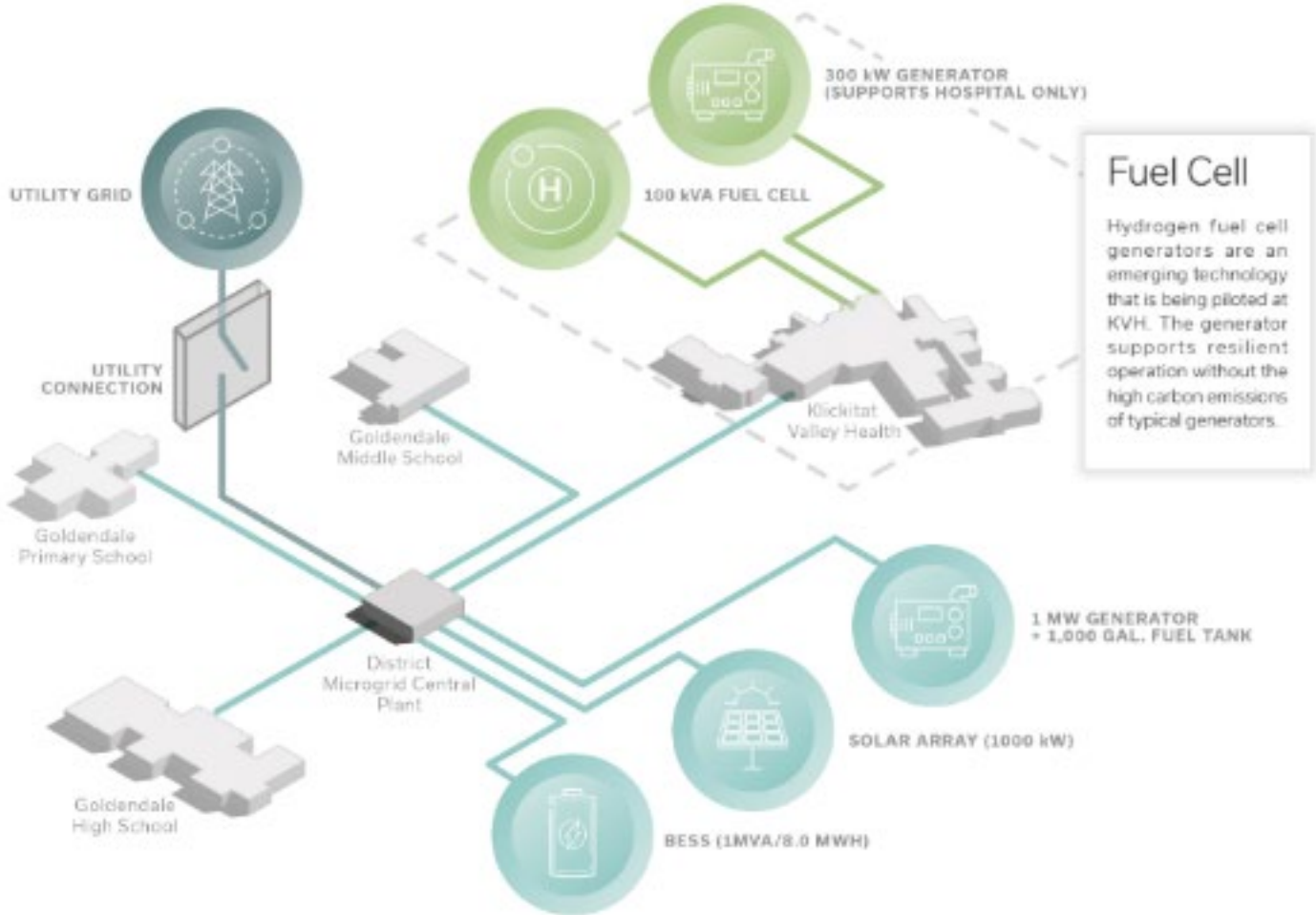

100kW-FC
KOHLER
KOHLER

Executive Summary

Goal: Concept microgrid connected to the Klickitat Valley Health and Goldendale School District buildings to provide resiliency to the city of Goldendale and Klickitat PUD.

Key Benefits:

- PV and battery reduce peak power on grid
- On-site PV reduces electricity consumption on grid
- During sunnier months, PV can power buildings beyond three days
- Islanded buildings continue to function during outage



Fuel Cell

Hydrogen fuel cell generators are an emerging technology that is being piloted at KVH. The generator supports resilient operation without the high carbon emissions of typical generators.

Normal Operation

CONNECTED TO GRID

During normal operation, the system will help reduce operating costs for the connected buildings and local power company. Operating cost savings are achieved from reduced consumption (PV array) and reduced demand charges. Annual operational savings is projected to be $95,000.

Resilient Operation

DISCONNECTED FROM GRID

During a disruption the microgrid is designed to power the connected buildings for 3 days. The buildings can act as a resilient district, providing shelter and a staging location for the region.

Energy (MWh)

Ground Source Heat Pump System:

69% Reduction in Energy Use

60% Reduction in Utility Cost

93% Reduction in CARBON EMISSIONS


Thank You!

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Presented by
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&
Azania Heyward-James

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From the Capital 2 Coast

Our Collaborative Effort Using Energy Storage for Social Equity in the Southeastern Region of the USA

The Cornerstone Collective 2020

HARAMBEE HOUSE Citizens for Environmental Justice

West Atlanta Watershed Alliance WAWA A Healthy Environment = A Healthy Community

Ayika Solutions, Inc.
Providing environmental strategies today that sustain whole communities tomorrow.

From the Capital 2 Coast

Our Collaborative Effort Using Energy Storage for Social Equity in the Southeastern Region of the USA

Equitable pathway for energy burden communities in Atlanta and Savannah to design and implement our self defined desire of community resiliency that moves beyond energy efficient homes towards self sufficient, net-zero homes.

Purpose

Identify the optimal size of a PV and battery energy storage system (PV + BESS) and estimate the costs of a system that can achieve energy self-sufficiency for Atlanta and Savannah's low- and moderate-income households, which are considered as the representative case for 12 load profile (small, medium, and large, with electric or natural gas heating) in this study.

Figure 2. Connally Street SE, Atlanta example households.

Neighborhood: Connally St SE

House/Load Sizes:

- Small
  - Consider up to 3.25 kW PV
- Medium
  - Consider up to 4.25 kW PV
- Large
  - Consider up to 6 kW PV

Assumptions:

- South-facing roof
- Allow PV Export
  - Compensation based on 2022 Avoided Energy Cost Rate Tariff (Georgia Power)
- Allow BESS charging from utility

Scenarios:

- Small, Medium, Large Household Annual Energy Consumption
- Electricity/Gas Heating Method
- Tariff
  - R-25
  - TOU-RD-6
  - TOU-REO-13

Optimized for:

- 4-hour outage during highest demand/least solar resource
  - Cost + Resiliency
  - Cost + Resiliency - Forced-PV (rooftop area maximized)

Figure 1. Archer Street, Savannah example households.

Neighborhood: Archer St

House/Load Sizes:

- Small
  - Consider up to 3.25 kW PV
- Medium
  - Consider up to 4.25 kW PV
- Large
  - Consider up to 6 kW PV

Assumptions:

- Southwest facing roof
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Optimized for:

- 4-hour outage during highest demand/least solar resource
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Lessons Learned

- In Georgia, the policy landscape at the state level has imposed barriers to the rapid and equitable deployment of renewables and storage; the absence of legislation enabling and defining net metering, community solar, and energy storage deployment result in utility-led programs that impose costs and limits on the growth of the renewable energy economy in Atlanta and Savannah.

- The technoeconomic optimization analysis of the 12 residential load profiles for Atlanta and Savannah demonstrates that **the current rate structures of Georgia Power are not economically favorable to PV + BESS in the residential setting**. For the representative load profiles considered, the investment cost of the system outweighs the financial benefits that result. **This result holds true for all household sizes, heating type, rate tariff, or locations considered in Georgia**. For households that want to prioritize resilience during an outage event, the most economically feasible option is to consider a battery backup system to keep charged in case of an emergency. However, it is important to note that the results presented in this analysis are based on **technoeconomic optimization**

Optimization for Resiliency Hubs

- Unlike the previous residential scenarios analyzed, which used the 2022 Avoided Energy rates prior to the December ruling, a PV + BESS has the potential to be economically favorable for the Harambee House based on the expected increase in the compensation rate for exported energy.
- Additionally, the electricity demand of the Harambee House is too great while the available area for PV installation is too small to allow the system to be entirely off the grid; the off-grid scenario was determined to be infeasible because the electricity demand could not be met with the maximized 3.285 kW PV system and any size battery; there simply is not enough electricity generated by that size PV system.

TAKE AWAY MESSAGE

Technoeconomic optimization

VS

Optimizing for resiliency

Rarely economical, the benefits of increased resiliency are not exclusively monetary and must be considered alongside the project finances.

#WEARETHEDATA

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Jon McCalip,
Director of Facilities and Projects,
Phoenix-Talent School District

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Open Door Mission Solar Plus Battery Storage

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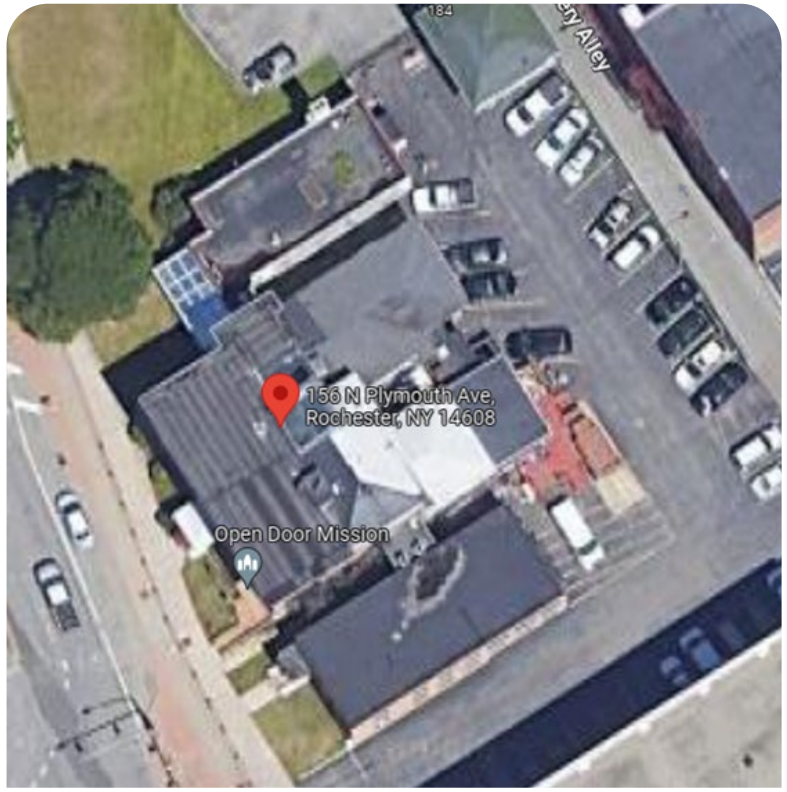

Project developed in partnership with Joule Community Power, Unity Renewables and Open Door Mission in Rochester who provides critical services such as meals, emergency shelter, affordable housing, and warming shelter among others.

Equity Considerations:
Poor local air quality and noise pollution compounded by lack of healthcare access.

High energy burdens faced by area residents likely due to inefficient systems and lack of weatherization, compounded by lack of access to well-paying jobs.

High rate of unemployment in Downtown Rochester (90th percentile for the state).

Community Impact Metrics 2022:

MEALS PROVIDED IN 2022
99,266

POUNDS OF CLOTHING COLLECTED
278,886

POUNDS OF FOOD COLLECTED
439,780

Project to include:

- 2.05 MWh (0.5125 MW, 4-hr duration) lithium-ion battery
- 31 kW rooftop solar array
- 20 kW carport solar array
- Four Blink series dual-port EV charging stations connected to battery
- Workforce development criteria for deployment